

January 29, 2002

MEMORANDUM FOR: John Williams
Assistant Project Director, Survey Section C

FROM: Charles W. Challstrom
Director, National Geodetic Survey

SUBJECT: INSTRUCTIONS: Reconnaissance, Bench Mark
Setting and Leveling in Puerto Rico (L26347)
Task Number: 8K6D2000

GENERAL:

The project is located on the island of Puerto Rico, and is the foundation of The Puerto Rico Vertical Datum of 2002. (See attached sketches for the approximate location of leveling routes.) This project will require precise leveling observations. A plan is being developed for GPS observations at selected bench marks after completion of the leveling.

PURPOSE:

The purpose of this leveling project is to establish primary vertical control in Puerto Rico, establish precise heights for the United States Coast Guard CORS site near Isabella and provide leveling connections between several tide stations. The majority of the existing vertical control (USGS third-order) on the island dates back to the early 1930's and 1940's.

LEVELING DATA FORMATS AND HANDLING:

- A. Leveling data will be submitted in "Blue Book" format (see "Input Formats and Specifications of the National Geodetic Survey Data Base," Volume I. Horizontal Control Data (revised November 1998) and Volume II. Vertical Control Data, Federal Geodetic Control Subcommittee, September 1994) to NGS Headquarters on floppy disks. Floppy disks shall contain the final version of the following files: HGF, HGZ, and HA in direct access format and RPT and ABS in sequential format. Data shall be submitted to the Field Operations Branch within 30 days of completion of the project.

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- B. All bench marks established during this leveling project must be plotted on the best available map and the positions scaled using standard procedures, if the bench mark position cannot be determined with a GPS instrument. One set of these maps shall be submitted with the data. Those recovered bench marks which do not have PIDs will be treated as new marks.
- C. Recovery bench mark descriptions shall be written in accordance with the "Blue Book" (unified descriptions), except do not submit incomplete descriptions (i.e., descriptions with Recovery Type Codes of "RM"), unless the bench mark is destroyed or not recovered.

LIAISON:

The street address of the following NGS offices in Building SSMC3 is:

1315 East-West Highway
Silver Spring, MD 20910-3282

Questions concerning overall survey operations shall be directed to:

William T. McLemore, Jr.
Chief, Field Operations Branch
Observation and Analysis Division
SSMC3 -- N/NGS41, Station 8564
Telephone: 301-713-3215, ext. 117
FAX: 301-713-4327
E-Mail: Bill.McLemore@noaa.gov

Questions concerning the leveling portion of the project shall be directed to:

Robert J. Siclari
Project Development Branch
Spatial Reference System Division
SSMC3 -- N/NGS2, Station 8735
Telephone: 301-713-3194, ext. 130
Fax: 301-713-4324
E-Mail: Bob.Siclari@noaa.gov

Contacts for the Puerto Rico project:

Coast Guard Station La Puntilla
Primary Tide Gauge
Mr. Jorge Gaudier
Assistant Engineering Officer
Telephone: 787-729-4304
E-mail: jgaudier@coqui.net

Coast Guard DGPS Site Isabella
CWO Jim Bailey
Telephone: 787-402-2191

U.S. Army Corps of Engineers
Jacksonville District Office
Mr. David Robar
400 West Bay Street
Jacksonville, FL 32232
Telephone: 904-234-1603
E-mail: david.j.robar@saj02.usace.army.mil

Hector Sanabria Valentin
Professional Land Surveyor
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Gerardo Cerra
Professional Land Surveyor
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Telephone: 787-725-5856
E-mail: gerardocerra2@yahoo.com

Contact for Arecibo Observatory:

Jose Maldonado
Assistant Director for Facilities
Telephone: 787-878-2612, x-266
E-mail: jmaldonado@naic.edu

The Geodetic Coordinator for Puerto Rico is:

Linda Velez-Rodriguez
Surveying and Land Information Systems Laboratory
College of Engineering
University of Puerto Rico
Mayaguez, PR 00681-5000
Telephone: 787-832-4040, x-5405
E-mail: lindal@ce.uprm.edu

ADDRESS:

Keep the Field Operations Branch informed of the party's physical address and telephone number at all times.

PUBLICITY:

See "NGS Operations Handbook," Section 1.4.1.

EXPENSES:

Expenses for this project will be charged to Task Number 8K6D2000.

TRAVEL:

Travel and per diem are authorized in accordance with Civilian Personnel Per Diem Bulletin Number 221. Current per diem rates were effective November 1, 2001, and are still in effect.

ACKNOWLEDGMENT:

Please acknowledge receipt of these instructions in your Monthly Report.

Attachments

cc: N/NGS - D. Zilkoski
N/NGS - S. Misenheimer (first page only)
N/NGS - D. Milbert
N/NGS1 - G. Mitchell (first page only)
N/NGS11 - S. Cofer
N/NGS2 - E. McKay
N/NGS2 - D. Doyle
N/NGS21 - S. Frakes
N/NGS21 - C. Craig (first page only)
N/NGS21 - D. Hendrickson
N/NGS4 - E. Wade
N/NGS4 - D. Hoar
N/NGS4 - M. Vorhauer
N/NGS41 - W. McLemore
N/NGS41 - J. Blackwell
FGCS Members (first page only)
Coast Guard Station La Puntilla - Jorge Gaudier
Coast Guard Site Isabella - Jim Bailey
U.S. Army Corp of Engineers - David Robar
Marel Bayamon, Inc. - Hector Sanabria Valentin
Urb. Hacienda La Arboleda - Luis Berrios Montes
Department of Natural Resources - Gerardo Cerra
University of Puerto Rico - Linda Velez Rodriguez
Arecibo Observatory - Jose Maldonado

Attachment 1

PUERTO RICO LEVELING NETWORK

LEVELING CONNECTIONS:

Tie leveling to existing leveling lines, as described in the "Geodetic Leveling Manual," is required. Initial leveling operations from La Puntilla (with a spur to Castillo del Morro, or Morro Castle) to the CORS site located between Isabella and Aguadilla (approximately 160 km) will be performed by an NGS field unit assisted by contract personnel. Leveling will be extended to the Rafael Hernandez Airport, located approximately 5 km NE of Aguadilla. Ties to level lines L25588 and L25701 will be made in the vicinity of San Juan. 975 5371 A (PID TV1513) is the primary bench mark at San Juan and is also noted as being observable by GPS. There are several other marks that are also observable if A is not suitable. Bench marks 975 5371 K TIDAL (PID AA7653), 975 5371 J TIDAL (PID AA7652), and SJ 2 (PID AA7655) can be used for the three required tie marks at San Juan. The route will follow generally Route 22/Route 2 West. At Barceloneta follow Route 140-Route 684-Route 681 to HARN station TUNA (PID TV1182). The U.S. Coast Guard CORS site reference stations AGUA USCG A and AGUA USCG B located at the Municipio de Aguadilla U.S. Naval Transmitter Site must be leveled to. Leveling is also required to the tidal bench marks at the Aguadilla Crash Boat Dock (Tide Station 975 9412).

The leveling crew should also visit the National Astronomy and Ionosphere Center, Arecibo Observatory (<http://www.naic.edu>) and investigate the possibility of recovering an existing station or setting a new mark for future leveling and GPS observations. The contact person for the Observatory is listed above.

All High Accuracy Reference Network (HARN) control points (MONTEREY, PID AB9832; MANATI, PID AB9831; NOVA 2, PID TV1290; QUEBRAS 2, PID AB9830; and BQN C STEM, PID AB9829) within 4 km of the leveling route and all other existing NSRS horizontal control and USGS bench marks (where practical) within 1 km of the leveling route will be connected to this project.

LEVELING SPECIFICATIONS:

The line shall be leveled in both directions to first-order, class II standards. Leveling in one direction is acceptable when leveling between old bench marks, provided the newly observed elevation difference agrees with the previous difference within tolerance limits. When new marks are set, or the newly observed elevation difference between two old marks does not agree with the previous difference within tolerance, one side of the new or moving mark must be leveled in both directions.

In addition, if multiple new marks are set between old marks, all but one section between the old marks are to be leveled in both directions. Specifications and other technical considerations for this project are given in the "NGS Operations Handbook," "Geodetic Leveling Manual," "Bench Mark Manual," and "Interim FGCS Specifications and Procedures to Incorporate Electronic Digital/Bar-Code Leveling Systems."

LEVELING PROJECT TITLE, HGZ NUMBER, AND JOB CODE:

- A. The leveling project title, HGZ number, and job code shall be named, respectively:

ESTABLISHMENT OF PRIMARY VERTICAL CONTROL FOR PUERTO RICO
2002
L26347
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